

WHAT IS CLAIMED IS:

1. A method for treating degenerative skin conditions in a subject in need thereof, said method comprising applying at least one electric pulse to the surface of a region of skin substantially contemporaneously with application thereto of a composition comprising L-ascorbic acid, or a cosmetically/pharmaceutically acceptable salt, ester or reducing derivative thereof, said electric pulse having sufficient strength and duration to deliver an effective amount of the L-ascorbic acid or the derivative thereof through the stratum corneum of the region of skin, thereby improving the condition of the region of skin without substantial pain or skin irritation.
2. The method according to claim 1 whereby production of collagen is enhanced in the region of skin.
3. The method according to claim 1 wherein the level of free oxygen radicals is reduced in the region of skin.
4. The method according to claim 1 wherein the concentration of L-ascorbic acid, or the derivative thereof, in the composition is in the range from about 1% to about 35% by volume.
5. The method according to claim 1 wherein the composition is formulated as a cream or lotion.
6. The method according to claim 1 wherein the composition is formulated as an emulsion, a crystal suspension, or the L-ascorbic acid, or the derivative thereof, is encapsulated in liposomes or microspheres.
7. The method according to claim 1 wherein the composition is formulated as an aqueous solution or suspension.

8. The method according to claim 1 wherein the electrical pulse is monopolar or bipolar.
9. The method according to claim 1 wherein the electric pulse has a voltage from about 25 volts to about 120 volts.
10. The method according to claim 9 wherein the electric pulse has a voltage from about 50 volts to about 80 volts.
11. The method according to claim 1 wherein a plurality of the electric pulses are applied.
12. The method according to claim 11 wherein the plurality of pulses comprises at least one train of from about 1 to about 30 pulses.
13. The method according to claim 12 wherein a plurality of the trains is applied.
14. The method according to claim 11 wherein the time interval between the plurality of pulses is in the range from about 0.1 sec to about 15 sec.
15. The method according to claim 1 wherein the pulse duration is in the range from about 10 μ sec to about 100 msec.
16. The method according to claim 13 wherein the pulse duration is in the range from about 500 μ sec to about 50 msec.
17. The method according to claim 15 wherein the pulse duration is in the range from about 2.0 msec to about 20 msec.

18. The method according to claim 1 wherein the region of skin is on the face, hand, arm, neck, chest, or leg, and the composition is formulated as a cream or lotion.

19. The method according to claim 18 wherein the electric pulse has a voltage from about 60 volts to about 80 volts and a duration in the range from about 2.7 msec to about 20 msec.

20. The method according to claim 1 wherein the region of skin is on the face, hand, arm, neck, chest, or leg and the composition is formulated as an aqueous suspension or solution.

21. The method according to claim 20 wherein the electric pulse has a voltage up to about 50 volts and a duration of up to 2 msec.

22. The method according to claim 1 wherein the pH of the composition is in the range from about 4.0 to about 5.0 and delivery of the L-ascorbic acid, or the derivative thereof, is enhanced up to three-fold as compared with passive delivery thereof.

23. The method according to claim 1 wherein the derivative is L-ascorbic acid -2-phosphate or magnesium ascorbyl phosphate.

24. The method according to claim 1 wherein the pH of the composition is in the range from about 1.85 to about 3.9 and the and delivery of the L-ascorbic acid, or the derivative thereof, is enhanced about 30% to about 50% as compared with passive delivery thereof.

25. The method according to claim 1 further comprising chemically or mechanically enhancing the permeability of the stratum corneum.

26. The method according to claim 25 wherein the enhancing involves application to the region of skin of a chemical enhancer or microdermalabrasion.

27. The method according to claim 1 further comprising iontophoresis.

28. A method for electroporation-enhanced dermatological delivery of L-ascorbic acid through the stratum corneum of a subject in need thereof, said method comprising applying at least one electric pulse to the surface of a region of skin substantially contemporaneously with application thereto of a composition comprising ascorbic acid, or a cosmetically/pharmaceutically acceptable salt, ester or reducing derivative thereof, said electric pulse having sufficient strength and duration to topically deliver an effective amount of the L-ascorbic acid or the derivative to the region of skin.

29. A method according to claim 28 wherein the delivery is without substantial pain or skin irritation.

30. The method according to claim 28 wherein the concentration of L-ascorbic acid or the derivative thereof in the composition is in the range from about 20% to about 33% by volume.

31. The method according to claim 28 wherein the composition is formulated as a cream or lotion.

32. The method according to claim 28 wherein the composition is formulated as an emulsion, a crystal suspension, or the L-ascorbic acid or the derivative is encapsulated in liposomes or microspheres.

33. The method according to claim 28 wherein the composition is formulated as an aqueous solution or suspension.

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34. The method according to claim 28 wherein the electrical pulse is monopolar or bipolar.

35. The method according to claim 28 wherein the electric pulse has a voltage from about 25 volts to about 120 volts.

36. The method according to claim 28 wherein the electric pulse has a voltage from about 50 volts to about 80 volts.

37. The method according to claim 28 wherein a plurality of the electric pulses are applied.

38. The method according to claim 37 wherein the plurality of pulses comprises at least one train of from about 1 to about 10 pulses.

39. The method according to claim 38 wherein a plurality of the trains is applied.

40. The method according to claim 38 wherein the time interval between the plurality of pulses is in the range from about 0.1 sec to about 15 sec.

41. The method according to claim 28 wherein the pulse duration is in the range from about 100 μ sec to about 100 msec.

42. The method according to claim 41 wherein the pulse duration is in the range from about 500 μ sec to about 50 msec.

43. The method according to claim 28 wherein the pulse duration is in the range from about 2.0 msec to about 20 msec.

44. The method according to claim 28 wherein the region of skin is on the face hand, arm, neck, chest, or leg, and the composition is formulated as a cream or lotion.

45. The method according to claim 44 wherein the electric pulse has a voltage of about 60 volts to about 80 volts and a duration in the range from about 2.7 msec to about 20 msec.

46. The method according to claim 28 wherein the region of skin is on the face, hand, arm, neck, chest, or leg and the composition is formulated as an aqueous suspension or solution.

47. The method according to claim 46 wherein the electric pulse has a voltage up to about 50 volts and a duration of up to 2 msec.

48. The method according to claim 28 wherein the pH of the composition is in the range from about 4.0 to about 5.0 and delivery of the L-ascorbic acid or the derivative thereof is enhanced up to three-fold as compared with passive delivery thereof.

49. The method according to claim 28 wherein the derivative is L-ascorbic acid --2-phosphate or magnesium ascorbyl phosphate.

50. The method according to claim 28 wherein the pH of the composition is in the range from about 1.85 to about 3.9 and the topical delivery of the L-ascorbic acid or the derivative thereof is enhanced about 30% to about 50% as compared with passive delivery thereof.

51. The method according to claim 28 further comprising iontophoresis.

52. The method according to claim 28 wherein the topical delivery enhances production of collagen in the region of skin.

53. The method according to claim 28 wherein the topical delivery reduces the level of free oxygen radicals in the region of skin.

54. The method according to claim 28 further comprising chemically or mechanically enhancing the permeability of the stratum corneum.

55. The method according to claim 54 wherein the enhancing involves application to the region of skin of a chemical enhancer or microdermalabrasion.

56. The method according to claim 28 further comprising iontophoresis.

57. A handheld pulser for use as an electroporation apparatus, said pulser comprising:

- a) a support member, and
- b) an electrode having an optional electrically conductive cover, wherein said support member is of a size and shape to be handheld, and wherein said electrode is attached to said support member and is operatively connected to a pulse generator.

58. A handheld pulser according to claim 57, wherein said pulse generator is contained within said support member.

59. A handheld pulser according to claim 57, wherein said electrode is detachable from said support member.

60. A handheld pulser according to claim 57, wherein said electrode comprises a porous reservoir for said therapeutic agent.

61. A handheld pulser according to claim 57, wherein said electrode cover is absorbent.

62. A handheld pulser according to claim 57, further comprising a detachable electrode mounting bracket.

63. A handheld pulser according to claim 62, wherein said detachable electrode mounting bracket has said electrode detachably adhered thereto.

64. A handheld pulser according to claim 62, wherein said electrode mounting bracket is square, round, contoured, or tube shaped.

65. A handheld pulser according to claim 64, wherein said tube shaped electrode mounting bracket has a central core comprising an axle, about which said electrode mounting bracket is rotatable.

66. A handheld pulser according to claim 61, wherein said electrode comprises an adhesive layer for attachment of said electrode to said electrode mounting bracket.

67. A handheld pulser according to claim 57, wherein said electrode is disposable.

68. A handheld pulser according to claim 57, wherein said electrode is a meander type electrode or a micropatch electrode.

69. A handheld pulser according to claim 68, said meander type electrode comprising an interweaving array of electrically conductive electrode fingers coated on a thin film.

70. A handheld pulser according to claim 69, said electrode fingers having a width of about 2mm, and wherein said electrode fingers are separated by a gap of about 0.2 mm.

71. A handheld pulser according to claim 57, wherein said pulse generator is powered by a battery, optionally contained within said support member.

72. A handheld pulser according to claim 57, wherein a portion of said support member is electrically conductive.

73. A handheld pulser according to claim 72, wherein said electrically conductive portion of said support member functions as a return conductor for said electrode when a conductive material is disposed between said electrode and said electrically conductive portion of said support member.

74. A handheld pulser according to claim 57, further comprising an injection means.

75. A handheld pulser according to claim 72, wherein said injection means comprises a hollow needle, in fluid communication with a reservoir for said therapeutic agent.

76. A handheld pulser according to claim 57, further comprising a vibrating unit.

77. A handheld pulser according to claim 57, further comprising a phonophoresis unit.

78. A handheld pulser according to claim 57, further comprising a pressure sensor unit.

80. A handheld pulser according to claim 57, wherein the handheld pulser is modified to a tableheld pulser.

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